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TRANSLATION

DECISION ON GRANT  
PATENT FOR INVENTION

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PRIORITY IS FIXED ON DATE

- ☐ (22) Date of filing the application  
☐ (23) Date of filing of additional materials of to the earlier application №  
☐ (62) ☐ priority date of the application № of from which the present application has been divided up  
☐ filing date of the application № of from which the present application has been divided up

☐ (66) Filing date of the earlier application №

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(54) Title VEHICLE INTEGRATED CONTROL SYSTEM

The Department of Vehicle Technique basing on the results of substantive examination of the patent application conducted in respect to

☐ originally filed claims ☒ claims amended by the applicant

has revealed the compliance of the claimed group of inventions with the requirements of patentability, set forth by Article 1349 and 1350 of the Civil Code of the Russian Federation and decided to grant the Patent of the Russian Federation for the following claims:



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(51) IPC

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(57)

1. A vehicle integrated control system comprising:

a plurality of control units (Power Train: PT, Electronic Controlled Brake: ECB, Steering: STR) operating autonomously for controlling a running state of a vehicle based on a manipulation request,

wherein each said control unit (PT, ECB, STR) comprises

sensing means for sensing an operation request with respect to at least one control unit (PT, ECB, STR), and

controller means for controlling said vehicle by generating a control target based on a sensed request, and manipulating an actuator set in correspondence with each unit, using said control target,

said system further comprising

a processing unit (Driving Support System: DSS, Vehicle Dynamics Management: VDM) operating parallel to each said control unit (PT, ECB, STR) for generating and providing to each said control unit (PT, ECB, STR) information to be used to modify said operation request or said control target, as necessary, at each said control unit (PT, ECB, STR),

said processing unit generating said information provided to each said control unit by processing information to be reflected to vehicle control and different from said operation request so as to be shared among each of said control units.

2. A vehicle integrated control system comprising:

a plurality of control units (PT, ECB, STR) controlling a running state of a vehicle based on a manipulation request, and

a processing unit (DSS, VDM) generating information to be used at each said control unit (PT, ECB, STR) based on environmental information around said vehicle or information related to a driver, and providing the generated information to each said control unit (PT, ECB, STR),

wherein each said control unit (PT, ECB, STR) comprises

sensing means for sensing an operation request with respect to at least one control unit (PT, ECB, STR), and

a calculation unit for calculating information related to a control target to manipulate an actuator set in correspondence with each unit using at least one of said information generated at said processing unit (DSS, VDM) and said sensed operation request,

said processing unit generating said information provided to each said control unit by processing information to be reflected to vehicle control and different from said operation request so as to be shared among each of said control units.

3. A vehicle integrated control system comprising:

a plurality of control units (PT, ECB, STR) controlling a running state of a vehicle based on a manipulation request,

and

a processing unit (DSS, VDM) generating information to be used at each said control unit (PT, ECB, STR) to cause said vehicle to realize a predetermined behavior, and providing the generated information to each said control unit (PT, ECB, STR),

wherein each said control unit (PT, ECB, STR) comprises

sensing means for sensing an operation request with respect to at least one control unit (PT, ECB, STR) and

calculation means for calculating information related to a control target to manipulate an actuator set in correspondence with each unit using at least one of said information generated by said processing unit (DSS, VDM) and said sensed operation request,

said processing unit generating said information provided to each said control unit by processing information to be reflected to vehicle control and different from said operation request so as to be shared among each of said control units.

4. A vehicle integrated control system comprising:

a plurality of control units (PT, ECB, STR) controlling a running state of a vehicle based on a manipulation request,

and

a processing unit (DSS, VDM) generating information to be used at each said control unit (PT, ECB, STR) based on a current dynamic state of said vehicle, and providing the generated information to each said control unit (PT, ECB, STR),

wherein each said control unit (PT, ECB, STR) comprises

sensing means for sensing an operation request with respect to at least one control unit (PT, ECB, STR), and

calculation means for calculating information related to a control target to manipulate an actuator set in correspondence with each unit using at least one of said information generated by said processing unit (DSS, VDM) and said sensed operation request,

said processing unit generating said information provided to each said control unit by processing information to be reflected to vehicle control and different from said operation request so as to be shared among each of said control units.

5. A vehicle integrated control system comprising:

a plurality of control units (PT, ECB, STR) controlling a running state of a vehicle based on a manipulation request,

a first processing unit (DSS, VDM) generating information to be used at each said control unit (PT, ECB, STR) based on environmental information around said vehicle or information related to a driver, and providing the generated information to each said control unit (PT, ECB, STR),

a second processing unit (DSS, VDM) generating information to be used at each said control unit (PT, ECB, STR) to cause said vehicle to realize a predetermined behavior, and providing the generated information to each said control unit (PT, ECB, STR), and

a third processing unit (DSS, VDM) generating information to be used at each said control unit (PT, ECB, STR) based on a current dynamic state of said vehicle, and providing the generated information to each said control unit (PT, ECB, STR),

wherein each said control unit (PT, ECB, STR) comprises

sensing means for sensing an operation request with respect to at least one control unit (PT, ECB, STR), and

first calculation means for calculating first information related to a control target to manipulate an actuator set in correspondence with each unit using at least one of said information generated at said first processing unit (DSS, VDM) and said sensed operation request,

second calculation means for calculating second information related to a control target to manipulate an actuator set in correspondence with each unit using at least one of said information generated at said second processing unit (DSS, VDM) and said calculated first information, and

third calculation means for calculating third information related to a control target to manipulate an actuator set in correspondence with each unit using at least one of said information generated at said third processing unit (DSS, VDM) and said calculated second information,

each of said first to third processing unit generating said information provided to each said control unit by processing information to be reflected to vehicle control and different from said operation request so as to be shared among each of said control units.

6. The vehicle integrated control system according to any of claims 2-5, wherein each unit operates autonomously and in parallel.

7. The vehicle integrated control system according to claim 5, wherein said first processing unit (DSS, VDM) comprises

means for sensing environmental information around said vehicle,

means for sensing information related to a driver of said vehicle, and

processing means for generating information processed such that said sensed information is shared among each said control unit (PT, ECB, STR).

8. The vehicle integrated control system according to claim 7, wherein said processing means includes means for generating information representing a degree of correction with respect to a request of said driver at each said control unit (PT, ECB, STR).

9. The vehicle integrated control system according to claim 5, wherein said second processing unit (DSS, VDM) comprises processing means for generating information processed so as to be shared among each said control unit (PT, ECB, STR), based on information for implementation of automatic cruising or pseudo automatic cruising of said vehicle.

10. The vehicle integrated control system according to claim 9, wherein said processing means includes means for generating information representing a degree of arbitration with respect to said control target at each said control unit (PT, ECB, STR),

11. The vehicle integrated control system according to claim 5, wherein said third processing unit (DSS, VDM) comprises processing means for generating information processed so as to be shared among each said control unit (PT, ECB, STR) to realize a behavior of the vehicle consistent with a control target, based on a current dynamic state of said vehicle.

12. The vehicle integrated control system according to claim 11, wherein said processing means includes means for generating information representing a degree of arbitration with respect to said control target at each said control unit (PT, ECB, STR).

13. The vehicle integrated control system according to any of claims 1-5, wherein said control unit (PT, ECB,

STR) comprises a driving system control unit (PT, ECB, STR) and a brake system control unit (PT, ECB, STR),

wherein said driving system control unit (PT, ECB, STR) and said brake system control unit (PT, ECB, STR) have a driving force and braking force distributed with respect to a requested driving force so as to realize a desired behavior of the vehicle in co-operation.

14. The vehicle integrated control system according to any of claims 1-5, wherein each said control unit (PT, ECB, STR) further includes means for controlling such that reflection of information from said processing means is rejected.

15. The vehicle integrated control system according to claim 5, wherein each said control unit (PT, ECB, STR) further includes means for providing information to said second processing unit (DSS, VDM) or said third processing unit (DSS, VDM).

16. The vehicle integrated control system according to any of claims 1-5, wherein each said control unit (PT, ECB, STR) is realized by each ECU, and operation is executed at said each ECU from an upper control hierarchy corresponding to a request of a driver towards a lower control hierarchy corresponding to each actuator.

17. The vehicle integrated control system according to any of claims 1-5, wherein said control unit includes a driving system control unit, a brake system control unit and a steering system control unit,

said driving system control unit (PT, ECB, STR) is realized by a first ECU,

said brake system control unit is realized by a second ECU,

said steering system control unit is realized by a third ECU,

operation is executed from an upper control hierarchy corresponding to a request of a driver towards a lower control hierarchy corresponding to each actuator at each said ECU,

said processing unit (DSS, VDM) is realized by a fourth ECU differing from said first, second and third ECUs,

said first to third ECUs have an operation controlled in parallel, and said fourth ECU is connected to an upper control hierarchy side of said first to third ECUs via an interface.

18. The vehicle integrated control system according to any of claims 1-5, wherein

said information to be reflected to vehicle control includes at least one of environmental information around said vehicle, information related to a driver of said vehicle, information for implementation of automatic cruising or pseudo automatic cruising of said vehicle, and information related to a current dynamic state of said vehicle.

19. The vehicle integrated control system according to claim 1 or 2, wherein said processing unit (DSS, VDM) comprises

means for sensing environmental information around said vehicle,

means for sensing information related to a driver of said vehicle, and

processing means for generating information processed such that said sensed information is shared among each said control unit (PT, ECB, STR).

20. The vehicle integrated control system according to claim 1 or 3, wherein said processing unit (DSS, VDM) comprises processing means for generating information processed so as to be shared among each said control unit (PT, ECB, STR), based on information for implementation of automatic cruising or pseudo automatic cruising of said vehicle.

21. The vehicle integrated control system according to claim 1 or 4, wherein said processing unit comprises

processing means for generating information processed so as to be shared among each said control unit (PT, ECB, STR) to realize a behavior of the vehicle consistent with a control target, based on a current dynamic state of said vehicle.

22. The vehicle integrated control system according to claim 3 or 4, wherein each said control unit (PT, ECB, STR) further includes means for providing information to said processing unit (DSS, VDM).

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Description in the original Applicant's version will be used in publishing information about grant of a patent.

Original drawings will be used in publishing information about grant of the patent.

Appendix: Abstract corrected by the Examiner on 1 sheet.

Chief Assistant of the Department of Vehicle Technique

Dolgih V.I.

By application # 2006126053/11

**(54) VEHICLE INTEGRATED CONTROL SYSTEM**

**Abstract**

(57) The group of inventions relate to combined control systems for controlling units of a vehicle. An integrated control system includes a main control system (accelerator) controlling a driving system, a main control system (brake) controlling a brake system, and a main control system (steering) controlling a steering system, an adviser unit generating and providing information to be used at each control system based on environmental information around the vehicle or information related to a driver, an agent unit generating and providing information to be used at each of the main control systems to cause the vehicle to realize a predetermined behavior, and a supporter unit generating and providing information to be used at each of the main control systems based on the current dynamic state of the vehicle. The proposed variants of the system are characterized by increased reliability and enable simple addition of vehicle control functions.

5 independent claims and 17 dependent claims, 10 figures